**ORIGINAL RESEARCH**

# Correlation of 5 independent markers of metabolic syndrome in psoriasis patients: a case control study

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Received: 20 February, 2023 Accepted: 26 March, 2023

## ABSTRACT

**Background:** Psoriasis is a persistent inflammatory condition that affects skin as well as other parts of the body. Psoriasis has been linked to metabolic syndrome in previously conducted studies and has been the subject of its own fair share of research. **Aim**: Correlation of 5 independent markers of metabolic syndrome with psoriasis patients. **Material and methods:** A total of 200 people who had clinically confirmed psoriasis as well as 200 people who did not have psoriasis but attended the outpatient dermatology department, were involved in the study. Individuals who were not receiving any systemic medicines at the time of the trial and who did not have hyperglycemia, a disordered lipid profile, or hypertension were chosen for the research.Blood pressure, body mass index, waist circumference, fasting lipid profile, and blood sugar were assessed in all subjects**. Results:** There were 200 individuals diagnosed with psoriasis.Metabolic syndrome was significantly more common in psoriatic patients than in controls (57% vs. 17.33%, P = 0.00001).Psoriatic patients had higher prevalence of raised fasting blood sugar (46.5% vs. 17.5%, P =0.00001 ), hypertriglyceridemia (34% vs. 24%, P = 0.0275), low high-density lipoprotein (55.5% vs. 19%,P = 0.00001), and hypertension (21% vs. 12%, P = 0.0153). Hence a temporal association was found between the psoriasis and individual components of metabolic syndrome. **Conclusion:** The present study concluded psoriatics having chronic course have a temporal association with the metabolic syndrome and a substantially greater incidence of its components.

**Keywords:** Metabolic syndrome, psoriasis ,inflammation



## INTRODUCTION

Psoriasis is a common T cell-mediated chronic inflammatory disease, characterized by predominant skin involvement in the form of erythematous plaques with silvery white scales involving the scalp, extensor surfaces of the body i.e. elbows and knees, as well as the back and trunk. It is estimated that 2%–3% of the people across the globe are affected by psoriasis [1]It is a multifactorial condition that can be caused by a combination of genetics and environment leading to both short-term and long-term consequences. Psoriasis can have a significant impact on patients' social and psychological well-being in addition to causing dreaded deformities as well as involve multiple body systems.

Psoriasis has been reported to be associated with metabolic syndrome (MS), also known as syndrome X which is a constellation of various risk factors such as central obesity, hypertension, atherogenic dyslipidemia, and hyperglycemia.This association of psoriasis with metabolic syndrome holds true regardless of the severity of the psoriasis.[2] Psoriasis sufferers have a considerable deterioration in their quality of life as a result of comorbidities such as diabetes , hypertension etc.[3]

The prevalence of metabolic syndrome (MS) has been estimated to be anywhere from 15 -24 % in the general population and 30 to 50 percent among those suffering from psoriasis [4]This indicates an upward trend in the incidence of MS over the last few years. It has been reported that the obese population, in particular, has an incidence of psoriasis that is as frequent as twice than in the general population[5].This is because obesity decreases treatment responsiveness,

and therefore appears to be one of the primary reasons for the development of premature cardiovascular diseases.

The goal of the present case control research was to evaluate the correlation between metabolic syndrome and its individual components, such as obesity, hypertension, diabetes, and dyslipidemia, in patients with psoriasis vulgaris.

## MATERIALS & METHODS

A hospital based case control sectional study was conducted over the period of 2 years at a tertiary care centre. A total of 200 clinically diagnosed cases of psoriasis , along with 200 controls without psoriasis attending outpatient Department of Dermatology were enrolled. Patients who were not taking any systemic drugs known to precipitate psoriasis or cause hyperglycemia, deranged lipid profile & hypertension were also selected for study.

After obtaining institutional ethics committee approval and informed consent from the patients the study was commenced. Relevant data such as age, sex, weight , height , age at the onset of psoriasis , duration of psoriasis , smoking & alcoholic habits, percentage of body surface area involvement and psoriasis area and severity index were evaluated. All cases & controls were subjected to blood pressure measurement, waist circumference & body mass index. Laboratory data included triglyceride levels, high density lipoproteins, cholesterol level & fasting glucose (at least 8 hours) were assessed. Waist circumference was determined with the help of measuring tape kept at the level of upper most part of hip bone around the abdomen. BMI was calculated as weight in kilograms/ height in meter$^2$. Blood pressure was recorded as average of two measurements with gap of 5-10 minutes. Severity of psoriasis was graded according to psoriasis area and severity index and percentage of body surface area involved .Metabolic syndrome was diagnosed by the presence of 3 or more of the 5 criteria of the National Cholestrol Education Program's Adult Treatment Panel that consists of 5 risk factors shown in table 1.

Statistical aspect- Data was compiled on excel sheet and analysed using SPSS software. Descriptive statistics such as mean weight, height and BMI were calculated and individual Tests of significance were applied. Association between the study variables was done using chi square test . $P<0.05$ was considered to be statistically significant.

**Table 1: Risk factors**

| 5 risk factors | defining level |
|---|---|
| Blood pressure | >130/85 mmHg |
| Waist circumference | MEN>102 cm(>40 inch) WOMEN >88 cm(>35 inch) |
| Fasting glucose | >100 mg/dl |
| Triglycerides | >150 mg/dl |
| Hdl cholestrol | <40 mg/dl MALES , <50 mg/dl FEMALES |

## RESULTS

The study comprised 200 cases along with 200 age & sex matched controls. Out of total cases 136 were males and 64 females and with male to female ratio of 2.12:1 .Majority of patients (21%) belonged to the age group 41-50 followed by 51-60 years (19%) age group while least number of cases (10%) were seen in < 20 years age. The age and gender distribution of cases and controls as well as their descriptive parameters is shown in **table 2 and 3**.

**Table 2 Age distribution of the participants**

| Age Range (years) | Cases (n=200) | | | | Controls (n=200) | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | % | Female | % | Male | % | Female | % |
| 0 -20 | 14 | 7 | 6 | 3 | 13 | 6.5 | 6 | 3 |
| 21 – 30 | 28 | 14 | 6 | 3 | 27 | 13.5 | 12 | 6 |
| 31 – 40 | 24 | 12 | 13 | 6.5 | 28 | 14 | 8 | 4 |
| 41 – 50 | 28 | 14 | 14 | 7 | 24 | 12 | 16 | 8 |
| 51 – 60 | 25 | 12.5 | 13 | 6.5 | 27 | 13.5 | 14 | 7 |
| 61 -70 | 17 | 8.5 | 12 | 6 | 17 | 8.5 | 8 | 4 |

**Table 3: Descriptive parameters of cases and controls**

| | Criteria | Cases (n=200) | Control (n=200) |
|---|---|---|---|
| | Average Weight Kg | 62.17 | 64 |
| | Average Height cm | 158.68 | 160 |
| | Average BMI, Mean $\pm$ SD | 25.18 $\pm$ 7.58 | 25.30 $\pm$ 7.35 |
| Alcoholic, n (%) | | 72(36 %) | 48(24 %) |
| Smoker, n (%) | | 78 (39 %) | 36(18 %) |

| | | |
|---|---|---|
| Physically inactive | 45 (22.5 %) | 33(16.5 %) |

The most common type of psoriasis was psoriasis vulgaris (90%) followed by psoriatic erythroderma (5%) , pustular psoriasis (2.5%)&palmoplantar psoriasis(2.5%)Among the 200 psoriasis patients, metabolic syndrome was associated in 114 patients (57%) whereas only 34 controls (17.33%) had metabolic syndrome& it was statistically significant(<0.05) In present study, the abdominal circumference was found to be higher among cases (40%) compared to controls (21%) with odds ratio of 2.5079 (p=0.000037). We also observed a higher prevalence of high fasting blood sugar level among the psoriasis group (46.5%) as compared to controls (17.5%) with Odds ratio of 4.0975 (p<0.0001). In addition to this high level of triglycerides was more prevalent among cases (34%) compared to controls (12%) with odds ratio of 1.6313 (p=0.0275). Significantly lower levels of high density lipoproteins were found in 55% cases as compared to 19% controls. The details of laboratory parameters has been shown in **table 4**.

**Table 4: Laboratory criteria of participants**

| Parameters | Cases, (n=200) | | | Controls, (n=200) | | | Odd's ratio | P value |
|---|---|---|---|---|---|---|---|---|
| | Present(a) | Percent % | Absent(b) | Present(c) | Percent % | Absent(d) | | |
| **Abdominal circumference (>102 cm in men and >88 cm in women)** | 80 | 40 | 120 | 42 | 21 | 158 | 2.5079 | 0.000037 |
| **High fasting blood sugar levels level (≥100 mg/dl)** | 93 | 46.5 | 107 | 35 | 17.5 | 165 | 4.0975 | 0.00001 |
| **High blood pressure (≥130/85 mmHg)** | 42 | 21 | 158 | 24 | 12 | 176 | 1.9494 | 0.0153 |
| **Serum hypertriglyceridemia (triglycerides ≥150 mg/dl)** | 68 | 34 | 132 | 48 | 24 | 152 | 1.6313 | 0.0275 |
| **Low levels of high-density lipoprotein cholesterol (<40 mg/dl in men and <50 mg/dl)** | 111 | 55.5 | 89 | 38 | 19 | 162 | 5.3170 | 0.00001 |
| **Metabolic syndrome (3 or more parameters out of 5)** | 114 | 57 | 86 | 34 | 17 | 166 | 6.4720 | 0.00001 |

## DISCUSSION

Metabolic syndrome comprise a group of derangements that include hyperlipidemia, hypertension, hyperglycemia, central obesity, insulin resistance and a high risk of abnormal cardiovascular changes.[6]Although pathogenesis has not been determined yet, the surge of pro-inflammatory cytokines, particularly TNF-alfa and IL-6, which are overexpressed in psoriatic plaques, contribute to features of the metabolic syndrome [7]

TNF alfa, a crucial component in the aetiology of psoriasis, causes a rise in insulin resistance, inhibits the tyrosine kinase activity of insulin receptors, and activates Peroxisome proliferative receptor gamma, all of which promote epidermal proliferation.[4] Similar to TNF alfa, it is believed that IL-6 promotes epidermal hyperplasia in psoriasis, antagonizes insulin signaling, alters adipokine expression and mediates insulin resistance and obesity[8] while IL-6 in addition also alters erythrocyte sedimentation rate. [9]

Psoriasis patients have an increased production of angiotensin 2, which is formed from angiotensinogen in adipose tissue. This production of angiotensin 2 increases inflammatory processes, that in turn facilitates oxidative stress, hypertension, and atherosclerotic alterations .[10,11]

Psoriatic patients have a cardiovascular risk profile and is largely attributable to lipoprotein A reported to be significantly elevated in majority. [12] Genetic susceptibility loci PSORS2, PSORS3, and PSORS4 are equally shared by psoriasis and metabolic syndrome .[13]

In the current investigation, we identified a considerably greater prevalence of metabolic syndromes in 114 patients (57%), as opposed to 34 controls (17%), which is consistent with the findings of studies carried out by Gisondi et al[4] (30.1% cases vs. 20.6% controls, p=0.005). Similar findings were found in a study carried out in China by Greb JE et al. [3] where they found that individuals with psoriasis had a greater frequency of metabolic syndrome when compared to controls (14.3% vs. 10%).

When the individual components were broken down and analyzed, an elevated fasting blood sugar level of

100 mg/dl, which is one of the criteria for metabolic syndrome, was found in 46.5% of our patients with psoriasis, compared to 17.5% in controls. This finding is comparable to a study that Adisen E et al carried out in an Indian population where the prevalence of diabetes was 9.2% among patients of psoriasis. Psoriasis was shown to have a statistically significant link with increased fasting blood sugar levels according to a research carried out by Nisa and colleagues. (18% cases vs 5.33% controls). [2]

In our study, 68 (34%) cases fulfilled the elevated triglycerides >150 mg/dl as a criterion of metabolic syndrome, compared to controls, which was statistically significant which was similar to study conducted by Manu Singh etal in which 60 out of 194 subjects (30.9%) had elevated triglycerides i.e.>150mg/dl justifying the criteria of metabolic syndrome.[14]Also in our study reduced levels of high density lipoproteins were found in 55% of patients as compared to 19% of controls. This finding suggests that patients with metabolic syndrome are more likely to have lower levels of these lipoproteins.

Elevated blood pressure, defined as systolic 130 mm of Hg and/or diastolic 85 mm of Hg as a criterion of metabolic syndrome, was found higher in 21% cases than 12% of controls. This finding correlated precisely with study conducted by Sommer et al.[15], in which systolic and diastolic blood pressures were found to be significantly higher in psoriasis patients as 21.9% compared to 10.2% among the controls.

## CONCLUSION

The increased frequency of metabolic syndrome in patients with psoriasis led to a great burden not only on the health of patients but also on the managing dermatologists. Dermatologist should keep an eye for risk factors of Metabolic Syndrome in psoriatic patients. Concerns should extend to it while managing psoriatic patients. All psoriasis patients must be screened for cardio-vascular risk factors as per the proposed guidelines at the disease onset irrespective of the disease severity.Present study on metabolic syndromes suggests temporal correlation and relatively higher prevalence of its components in patients having chronic course of psoriasis. Furthermore, unhealthy lifestyle practices by patients such as smoking, alcohol, less physical activity can alter the overall course of psoriasis and put them on unfavorable cardiovascular risk and negative impact on quality of life.

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